beaten isles where garefowl probably breed" is delusive, for there is not one authenticated instance of the occurrence of this species within—or even very close to—that line. We think it unnecessary to point out further errors.

A Handbook of Cryptogamic Botany. By A. W. Bennett, M.A., B.Sc., F.L.S., and G. M. Murray, F.L.S. With 378 Illustrations. London and New York: Longmans, 1889. 8vo. Pp. 473.

It is now above thirty years since Berkeley's 'Introduction to Cryptogamic Botany' was published, and in that time an enormous advance has been made in added genera and species in all the orders and in our knowledge of the complicated life-histories of many of the lower types. It is remarkable that during so long a period of active work, in which the number of teachers and students has been so greatly multiplied, that no other work of a similar scope has been written in the English language. Partly, no doubt, this has arisen from the circumstance that in the teaching at our universities and medical schools Cryptogamic Botany gets pushed into a small corner, and partly because the field of study is so vast that it has now got specialized into several different departments: so that our fern-men know very little about fungi and our algologists about mosses.

Mr. Bennett has specially worked at Algæ, and in the present volume he has also undertaken the vascular orders and the Muscineæ, whilst Mr. Murray has dealt with the Fungi, including the Lichens, Mycetozoa, and Bacteria. What they have attempted is not to deal nearly so much as Berkeley did with tribes or even genera in detail, but to give a general summary of the life-history of the leading types of form, such as might be suitable for the use of teachers and advanced students. The book is copiously illustrated by woodcuts interspersed in the text, the figures being to a large extent borrowed from recent German handbooks, such as those of De Bary, Sachs, Schenck, Luerssen, and Thomé. Following the example of the last edition of Huxley and Martin's 'Elementary Biology,' they make use of a descending in preference to an ascending order as regards complication of structure. The series of orders is classified out under seven primary subdivisions as follows:—First the Vascular Cryptogamia. Here the orders are grouped under a heterosporous and isosporous series, Ophioglossaceæ being treated as a class distinct from Filices. A useful chapter, founded mainly on Solms-Laubach's recent 'Handbook of Vegetable Palæontology,' is added, upon the fossil types, which, in Equisetaceæ, Lycopodiaceæ, and Selaginellaceæ are arborescent and extremely different from anything in existence at present. The second subdivision deals with the Muscineæ, separating them into Musci and Hepaticæ. A better subdivision of the Musci would be to keep up *Archidium* alone as a distinct order, for the other genera here associated with it, *Phascum*, *Ephemerum*, and *Bruchia*, are now by all the best authorities classified with the Bryaceæ, and *Pleuridium*, as the figure given (fig. 122) shows, has the calyptra separated as a distinct cap. The

third subdivision deals with the Characeæ, which are now universally admitted as a distinct structural type. The fourth subdivision deals with the Algæ, and is fuller in detail than any other part of the book. The types included here are placed under eight classes—Florideæ, Confervoideæ Heterogamæ, Fucaceæ, Phœosporeæ, Conjugatæ, Confervoideæ Isogamæ, Multinucleatæ, and Cœnobieæ. In the fifth subdivision the Fungi are primarily subdivided as Phycomycetes and Sporocarpeæ, the Lichens being dealt with as parasitic fungi which do not develop beyond the earliest stage of germination without the aid of an algal host. Subdivision six deals briefly with the Mycetozoa, distinguished from the Fungi by their saprophytic nutrition and vegetative body constituting a plasmodium formed by the coalescence of peculiar swarm-spores. The seventh subdivision deals with the Protophyta, under which are included Diatoms, Protococcoideæ, and the Cyanophyceæ, the series ending with the Bacteria. Under each chapter is given a list of the principal recent memoirs that relate to its subject, and this bibliographical part of the work will be very useful to beginners and isolated workers.

The great puzzle for students in Cryptogamic Botany is in the nomenclature of the parts of the organism. It is most difficult to carry out the principle that the same organ should always bear the same name throughout the various orders, and that organs that are not identical should receive different names. The plan adopted by our authors is as follows :—They propose the restriction of the term spore to any cell which is produced by the ordinary processes of vegetation, not directly by a union of the sexual elements, which becomes detached for purposes of direct vegetative propagation. The simple term spore is used in the Pteridophyta and Muscineæ ; but in the Thallophytes it is generally qualified by a prefix, *e. g.* zoospore, tetraspore. The cell in which spores are found is called a sporange. In the heterosporous Pteridophyta the spores from which the female prothallium arises are called megaspores and those which give birth to the antherozoids microspores. The cases which contain them are called megasporangia and microsporangia. The cell containing the male organs of fertilization is called an antheridium and the fecundating bodies antherozoids. Spore being abandoned for the female reproductive organs it is proposed to use sperm as a root-term in its place, oosphere for the unfertilized protoplasmic mass, and *gone* as a root-syllable for the various forms of the entire female organ before fertilization. In a similar way they differentiate between a sexual and non-sexual multiplication of individuals, by calling the first process reproduction and the latter propagation. If some such plan of limiting terminology could be carried out it would effect a great gain in clearness and precision.

A general elementary handbook of this kind was much wanted, and it deserves and no doubt will obtain a wide circulation. The Pteridophyta and Muscineæ are now known as thoroughly as the Phanerogamia ; but in all the other divisions there is a wide field for further work in the study of life-histories.